

Solar-Powered Signage

Key Considerations and Benefits of a Solar-Powered Exterior Solution

Consumers are looking for sustainable alternatives and taking notice of companies who are concerned about social responsibility. Based on Fortune Magazine's 2010 list of most admired companies – of the ten highest ranked companies in terms of social responsibility, five are ranked 1st overall within their industry. Statistically, nine in ten Americans describe themselves as 'Consumer Conscious' and they pay attention to practices of businesses and products they support. 42% of Americans say that they are more likely to purchase products or services from a company with a good reputation of environmental responsibility. Finally, 39% of Americans prefer to buy products from environmentally conscious businesses.* Those who purchase goods and services that have an eco-friendly advantage often feel better about their purchases overall. With that said, solar energy is a highly visible eco-friendly application and clear alternative to traditional energy sources.



* Greener Buildings: Published May 20, 2010 "LEDs Poised to Outshine All Others in \$4.4B Lighting Market"

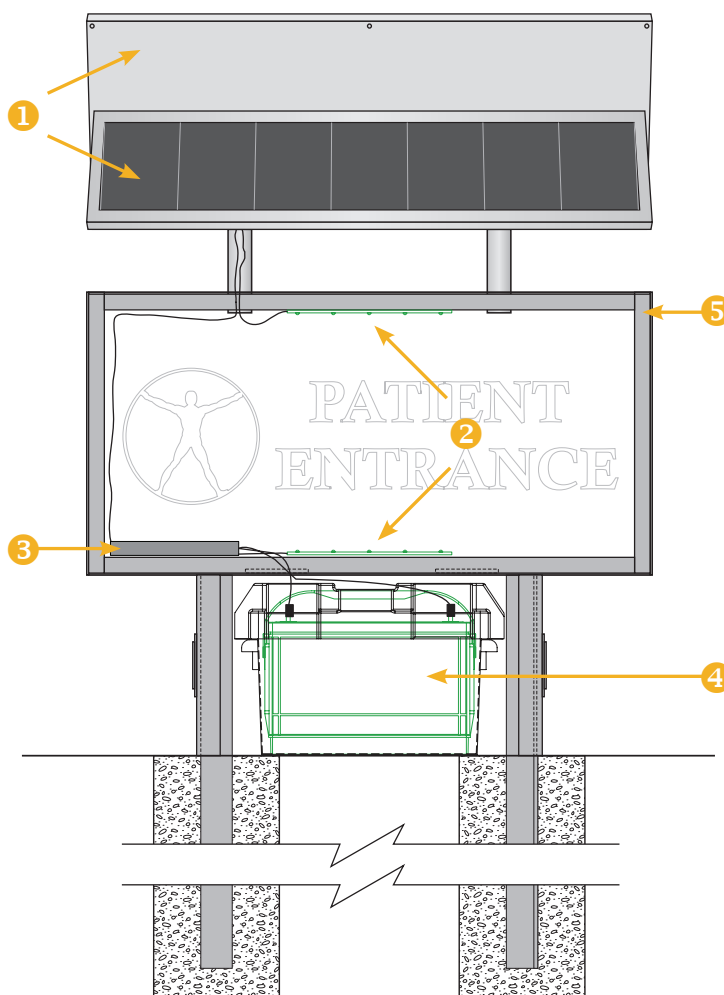
Solar-powered signage is a great eco-friendly branding solution that can be an economical replacement for an on-grid installation. An on-grid solution requires traditional power lines be connected to a sign for illumination from the public utilities. Therefore, immediate savings can be realized in certain locations where access to power must be installed, requiring expensive trenching or repaving when implementing a grid-powered sign. Even better, solar is seen by consumers as an obvious step in reducing the carbon footprint and making smarter energy choices. Once a solar-powered sign is installed it requires little or no maintenance and has a rapid return on investment (ROI). Plus, the use of solar power continues to become more affordable as demand and production increases.

Components of Solar-Powered Exterior Signage

There are five principal components of a solar sign:

- 1 Solar Panels (Photovoltaic or "PV" Panels)
- 2 LEDs (Light Emitting Diodes)
- 3 Power Management System
- 4 Battery
- 5 Sign Housing

The top portion of the sign housing has mounting supports for the PV panels. The PV panels then connect internally to a power management system. These systems can range from simple storage collection and control systems to very complex, artificial-intelligence-based power and illumination performance management systems. As sunlight is absorbed by the PV panels, the power management system behaves as the sign's brain. It directs the battery when there is sufficient energy available to provide energy to power the LEDs and switches the LEDs on and off, as required, defined, or appropriate. The power management system is a critical component of a solar sign because it controls all the illumination factors associated with the sign - from the time the LEDs power-on and off to learning about and "understanding" the sign's environment to ensure optimal lighting efficiency. All of these factors are evaluated together by the power management system to ensure optimum performance at the best value. As technology innovations develop in the solar industry, performance and value will improve, making solar-powered signage a more affordable, valuable, and prominent application in the architectural signage market.



Example of Internal Structure of a Solar-Powered Sign

Considerations when Evaluating Solar-Powered Signage

While solar-powered signage is a compelling option, prospective buyers want to know if they are getting a good product that is as functional as traditional signage.

Five Key Considerations when Considering Solar-Powered Signage

Sign Placement: Solar-powered signs have to be located in an area that receives optimal sunlight exposure. Therefore, the path the sun takes across the sky must be considered. Sign placement is critical when evaluating whether solar-powered signage is a viable option for the exterior signage program. Buyers need to understand if their desired signage placement will work.

Illumination: Based on the buyer's lighting requirements (time on, time off, brightness), the solar-powered sign will be designed to ensure that the maximum lighting performance can be provided while the maximum cost/benefit value can be achieved. While leading solar signage solutions have comparable illumination to traditional illuminated signage, "Vegas" style brightness and performance is cost prohibitive.

Design: There are certain design limitations which need to be considered with a solar-powered signage solution. PV panels have to be mounted in a prominent position to absorb as much sunlight as possible for optimal performance. One could run connection wiring from the sign and mount panels in a hidden location but this would defeat the purpose of saving costs on trenching.

Return on Investment: Will it be worth it for a client to invest in a solar-powered option? Sometimes solar requires an increased initial investment than a traditional grid-powered sign. A solar-powered sign's return on investment is primarily driven by the solar kit design and the sign location and performance requirements, but ultimately, all solar-powered signs will recoup all of the initial costs.

Branding: Organizations spend time and money developing a unique brand that reflects their core values. A solar-powered sign is a prominent indication of the value an organization places on the use of our planet's resources, particularly as it may impact future generations. However, with strongly managed brands, there may be brand standards that are not negotiable or modifiable. A solar-powered sign typically requires that PV panels are placed on the top of a sign, so some marketing managers may object to solar-powered design requirements such as the one shown below.

To maximize performance of a solar-powered sign, the PV panels are typically mounted on top of the sign to absorb sunlight. Clients in most cases prefer this placement, as it prominently communicates their use of alternate energy and demonstrates their commitment to the environment - a valuable brand enhancement.

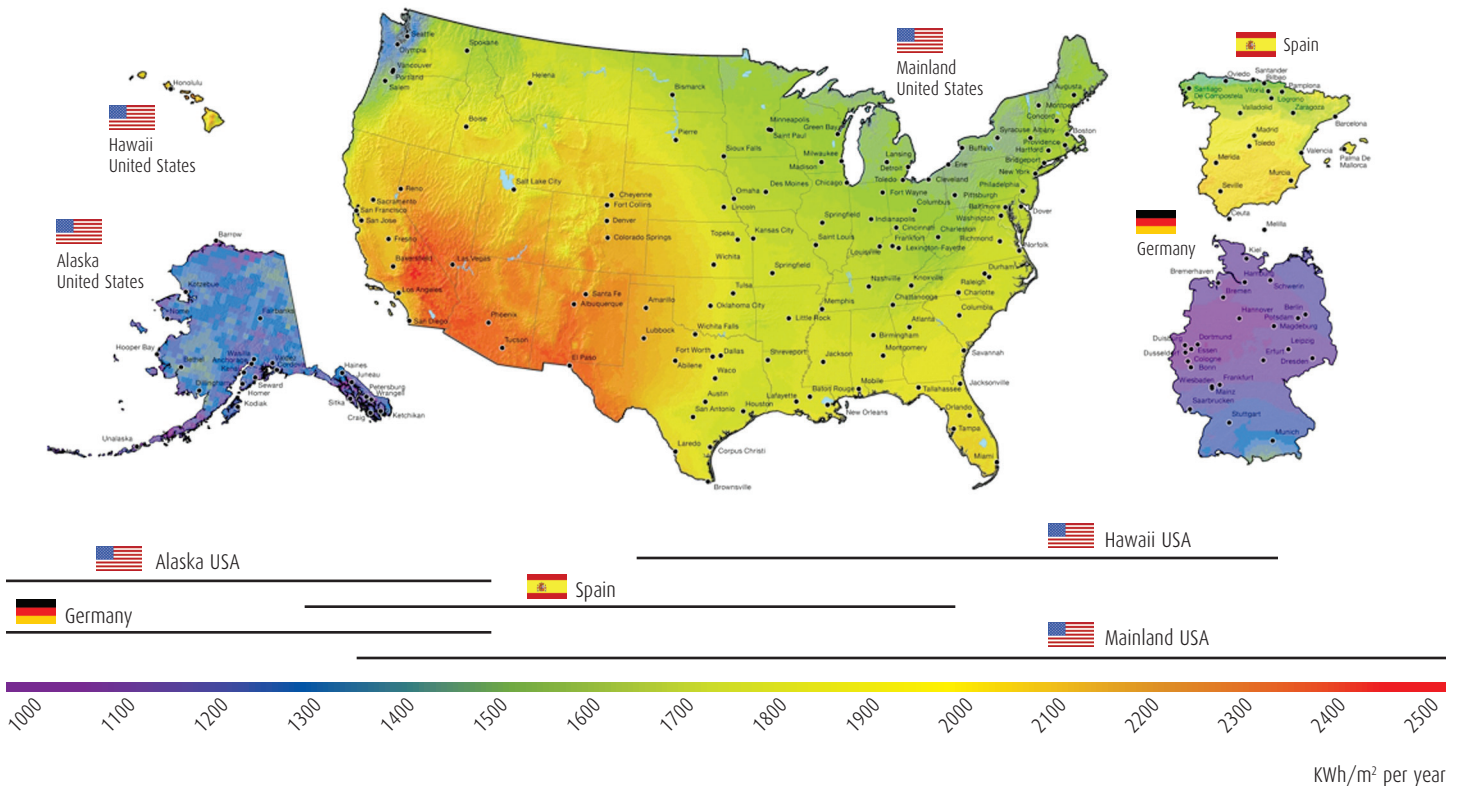
Employees, along with the community appreciate seeing this prominent display of PV panels, as it communicates innovation in environmental best practices.



Sign location and positioning are important factors in determining whether solar can be a viable option for an exterior signage program. The leading solar solution is designed to run for up to eight days without sunlight, based in large part on the location and positioning of the PV panels. As you may expect, a solar sign requires plenty of daylight to charge its batteries. NASA has collected extensive data on insolation factors across the U.S. and Canada – or measurements of the sun’s intensity at various locations during the year for the past 3 decades. Solar-powered signage must be strategically located to capture an optimum amount of sunlight to provide enough power to ensure that the sign will perform as required.

Geographic Considerations: There are long-held misconceptions that there is not enough daylight in many parts of the United States to power a solar solution effectively. This is typically not the case. The minimum amount of sunlight required for optimal operation is between 1200 to 1300 kWh/m² per year. Referencing the map below, typical sunlight conditions in the United States are sufficient to power most solar-powered signage applications. In contrast, **Germany, which is in the low range for sunlight, uses 30% more solar energy than the United States.** In fact, Germany is the world’s leading investor and installer of solar applications and solar power generation. So if solar is a viable power source for Germany, then it is even more viable for the United States.

Photovoltaic Solar Resource: United States - Spain - Germany:



This map was produced by the National Renewable Energy Laboratory for the US department of Energy.

April 19, 2009
 Author: Billy J. Roberts
 www.nrel.gov/gis

Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed by SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska are derived from a 40-km satellite and surface cloud cover data base for the period 1985-1991 (NREL, 2003). The data for Germany and Spain were acquired from the Joint Research Centre of States and countries are shown to scale, except for Alaska.

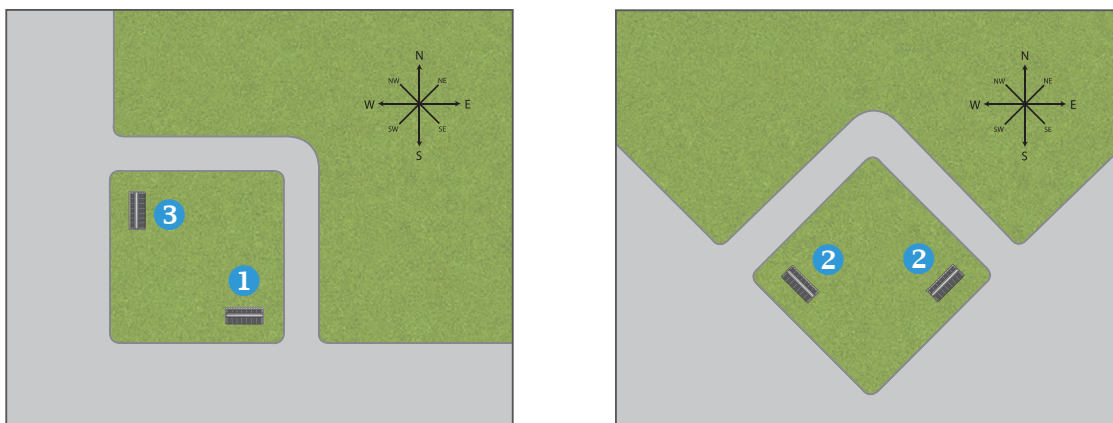
Solar-Powered Signage Site Placement

Before you make the investment in a solar-powered sign you will need to determine what location will provide maximum exposure to sunlight. For single PV panel configurations, this is done by verifying where your sign will be positioned, determining where magnetic or “solar” south is and facing the PV panel in that direction. However, certain PV panel configurations, such as a tented or gabled top, can face any direction so long as they are not shaded or blocked from exposure to the sun. The illustration below shows a variety of scenarios that could be possible solutions for installation.

For a general review Google Maps can be used to survey the existing site to identify an ideal location for sign placement. Ultimately, a site review will be required to make sure your sign is in a sunny spot (at minimum ensuring solar exposure between 10 a.m. and 3 p.m. and not shadowed by any large buildings, trees or light poles). Once you’ve determined ideal sign placement the angles of the PV panels need to be taken into consideration. For example, if you are installing a solar-powered sign in Dallas, TX you would take the latitude, which happens to be 32.78°, add 15° and mount the solar panel at an angle of 47.78°. If you have to mount your sign in a location where the largest PV panel will be facing southeast, southwest, east or west, then the angle of the panel may need to be adjusted. A solar signage consultant will take multiple factors into consideration to determine the best configuration – angle and quantity – of your solar panels.

Finding the Right Placement for Solar

While finding a location for a solar-powered sign sounds challenging, it is not that hard to identify the best placement. If an ideal placement cannot be found, the sign and solar kit can always be configured to ensure maximum performance. When the placement is a leading factor, additional PV panels or batteries are often utilized to ensure that solar is still an effective option.



Path of the Sun

Key

- | | |
|------------|---|
| Terrain | 1 Large PV panel should face south for ideal sun collection. |
| Roadways | 2 If PV panel must face southeast or southwest, assure full sunlight from 10 a.m. to 3 p.m. |
| Solar Sign | 3 Although not ideal placement for optimal sun collection, the sign can have alternate programming to operate. |

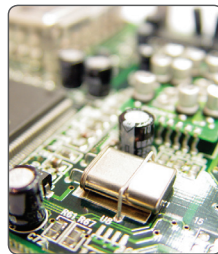


Post and Panel Solar-Powered Sign

Solar Power Management System

While solar energy capture is the first half of the story, power management is certainly the second half. If a solar-powered sign has an advanced – as opposed to a simple – power management system, it should remain illuminated during nighttime hours under the most adverse conditions, even during the darkest months of the year. Power management features should include monitoring the flow of electric current from PV panels after panels attain a minimum power level. It should make continual adjustments to maximize capture of fluctuating currents from the PV panels as daylight, temperature, and cloud conditions change.

Your power management system should also control the rate of current flowing to the battery to maximize the battery’s ability to absorb and store the energy, and monitor storage levels during battery charging to ensure that as much energy as possible can be packed into the battery. It should also prohibit overcharging of the battery to ensure there is absolutely no damaging excess current flow to a full battery, and should block reverse current flow from the batteries to the PV panels when power from the panels is less than the power in the battery (at night, under heavy clouds, etc.).



Power Management System



Battery



LEDs
(Light Emitting Diode)



LED Technology for Solar Signs

LED lights have made a significant impact on the illuminated signage market. LEDs are semiconductor chips except that rather than working like a computer they emit light when powered by electricity.

Because of those improvements, high efficiency white LEDs are a key factor in helping solar-powered signage to be a cost effective option for sign companies. Over the last three years, white LEDs have dramatically improved in light output brightness, energy efficiency and in ability to emit a true white light spectrum. These lights are typically rated for 50,000+ hours of life, which is about 12+ years of solar sign operation. While in conventionally powered signs, LEDs may not actually last as long as they are rated. Solar-powered signs with advanced power management are able to achieve those projected hours. An advanced power management system will run LEDs at less than their maximum brightness and intensity, which helps to ensure not only that there is enough power available in the batteries all year long, but also that the LEDs will not burn out early and last a full 50,000 or more hours.

Opportunities for Solar-Powered Signage

The U.S. solar market has grown significantly despite a sluggish economy in 2009, in which solar industry revenues climbed by 36% and venture capitalists invested more in solar than any other clean technology (\$1.4 Billion worldwide). Also, cumulative photovoltaic capacity increased by at least 40% in 2010.** Given these investments, the cost of using solar power as an alternative continues to decline significantly. Add the 30% Federal Solar Investment Tax Credit that encourages businesses to make investments in solar energy through an extension of the business solar investment tax credit (ITC), through 2016, and solar is even more appealing. All of these extra benefits help to make solar a viable consideration.



New Construction

Before you incur trenching and paving costs to run power for an exterior illuminated sign, investigate how an off-grid solar-powered sign can show immediate savings as costs to connect to the public utility system would not be incurred.



Grid Assist

The location of the sign may already have an existing power supply. In those cases your sign consultant should evaluate whether a solar/grid hybrid, or a grid-assisted solution would be appropriate. Grid-assisted solutions primarily use solar energy and only draw from the grid when necessary based on the performance requirements of the sign and the amount of sunlight available. This option could provide you further cost advantages while enabling even more robust performance requirements.



Retrofitting

Perhaps you have a situation where you already have exterior signage on site and you'd like to retrofit your existing signs with a solar solution. There are several options available - you may want to convert your sign to be illuminated or convert the sign from grid-power to a grid-assisted or fully off-grid solar solution.



Combination

When evaluating a signage program, consider all lighting and power methods available. Solar could be a cost effective and appropriate fit for a large or small percentage of your exterior signs, but not necessarily for all. This evaluation will help you consider how solar-powered signage can meet and enhance your exterior signage program needs, providing the energy-efficient solutions from an economic and environmental standpoint.

- Sign placement

** Forecast data provided by the Solar Energy Industry Association (SEIA)

If you're interested in learning more about solar-powered signage for your company or organization, visit ASI's website at asignage.com, email us at marketing@asignage.com, or call us at 1-800-274-7732, to request a signage consultation. ASI has 45 years of experience designing and installing wayfinding and identity solutions to companies and organizations around the world, including hospitals, educational institutions, and nonprofits, and can help you develop the best and most effective wayfinding system that will meet your needs.